



# POND CLEANING ACCESSORY FOR PADDLE BOAT

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## ABSTRACT

Rivers and water bodies are the backbone of a human civilization. The world depends on the water bodies for survival and India is no exception. We use waterbodies for drinking, washing, cleaning etc. Without water bodies survival is unimaginable. India is a developing country and uses the water bodies for many purposes. India is also a holy country and uses rivers and lakes extensively during festivals like ganesh visarjan and chath puja. Kumbh mela is also organized on the river banks. This leads to large scale river pollution. The government of India has taken charge to clean water bodies in the form of projects like “*Namami Gange*” and “*Narmada Bachao*”. The major constituent to this pollution is floating plastic. The plastic in water disturbs the aquatic ecosystem risking the life of fishes and marine animals. To reduce the surface water pollution this project aims to design and fabricate an accessory for paddle boats capable of collection floating waste and debris.

**KEYWORDS:** Pond cleaning machine, River cleaning machine, Water surface cleaning, Paddle boat accessory.

## I. INTRODUCTION:

River and water bodies are the backbone of life and civilisation. Water is mainly used for drinking, cleaning, washing etc. The current state of water bodies in the country is woeful. This calls for some action to be taken by the citizens of the country to clean the water bodies. The main constituent to the pollution is plastic. Plastic bottles, polythenes floating on the water are non-decomposable, meaning they remain unaffected and impact the aquatic life system. The manual cleaning is fatigue inducing and time consuming. To make the process of plastic removal from water bodies easy an accessory is needed to be developed which can work with paddle boats.

## II. AIM AND OBJECTIVE:

### Aim:

- Safe and effective collection of plastic pollutants
- Semi-automatisation of surface cleaning process

### Objectives:

- Design and fabricate an accessory capable of cleaning floating waste.
- Design and fabricate an accessory with sufficient waste collection capacity.
- Design and fabricate an accessory which is simple in working

## III. LITERATURE REVIEW:

Sheikh Md et al [1]: “The main emphasis was on the design and fabrication of a machine capable of collecting waste from rivers. The project consisted of a motor operated water wheel to run the machine. The device was coupled to four 12V, 7.6A DC motors. First motor was mounted on garbage collector, second and third motors were mounted on left and right waterwheel and the fourth motor was mounted on the carrying belt with the help of gear train and chain drive mechanism. The project consisted of two main shafts balancing and hoisting the sprocket of chain drive. First shaft was mounted at the front chain drive of the machine and second shaft was mounted at the rear chain drive with the help of inclined section and T-section respectively. The components were rest on a frame which served as the main body of the project. Steel pipes with pressurized air were used to generate pressure head assisting to run the project on water. The purpose of these pipes is to float on water, carrying the project weight as compressed air is placed in pipe creating a differential pressure head, causing machine to float on water. A storage tank was fabricated to collect the and store the waste until it's safe disposal. Gear drive was weld on the shaft with the help of connecting link and T-section. Water wheel is bolted on shaft which is placed on base frame. The purpose of water wheel was to move the machine forward or backwards on water. Motor was used to rotate the waterwheel with the help of chain drive mechanism. The machine fabricated was remote operated type. The total electrical device was controlled by RF transmitter and receiver, used the control the machine remotely. The collecting plate and chain drive were continuously being rotated by the motor. The conveyor was used to collect the waste. The collected waste was thrown out on the collecting tray with the aid of the conveyer. The authors also designed a machine by calculating all requisites using standard formulae. The machine in future could be powered by solar panels instead of batteries. The project was made only for a small lake and required only minimal modifications to make it serviceable in larger water bodies like Ganges. The future scope for

design of a machine usable for deep water cleaning was considered. The machine due to its design was best suited for collecting algae and polythene bags. The usage of conveyor however made it difficult to collect plastic bottles. This was because the bottles would slide down the conveyor back into the water.”

Ganesh U L et al [2]: “This paper highlighted the need for the usage of a mechanical drainage cleaner to replace the manual work required for drainage cleaning system. Drainage pipes are very dirty. Sometimes it is harmful for human life while it is need for cleaning drainage system. To overcome this problem, the group implemented a mechanical semi-automatic drainage water cleaner to make the water flow efficient because of regular filtration of wastages with the help of that project. Discussion on how different kinds of environment hazards could be reduced with the help of a clean drainage system achieved by using the machine was briefly looked upon. The main objective of the proposed work was the design of a mechanical drainer, taking into account the various factors that affect the equipment fabrication of the model and assembly of the model. While testing the machine flowrate of water was assumed to be uniform, depth of channel was considered as 1 feet and the channel height as 3 feet. An alarm was added to the collecting bin to indicate when the bin was completely filled and no longer able to collect more waste. The main disadvantage of this machine was the requirement of a very effective damping device to reduce the mechanical vibrations of the machine.”

Abhijeet Ballade et al [3]: “In this paper discussion regarding the effect of various festivals like ganesh visarjan and Navratri on the pollution of Godavari river was done. Ill effects of surface pollution on the aquatic life of the river was also talked about. To overcome this problem, a machine was fabricated. The machine was based upon water wheel driven garbage collection system. It consisted of conveyor mounted on two shafts. The shafts were coupled to pedestal bearings, while the bearings were mounted on the MS angle frame, the frame being welded and resembling the shape of slope facing machine part. The water wheel rotates due to power supplied to them, this power was supplied to the conveyor system by means of belt drive. As the machine was placed in water the waste debris in the water would get lifted and move in upwards direction. After the debris reached the upper extreme position it would drop in the collection tray. After collection of debris from the water, the debris is carried out of the water.”

Madhavi N. Wagh et al [4]: This paper introduced the usage of a microcontroller to control the river cleaning machine. The microcontroller used was Atmega 328P mounted on Arduino board. A Bluetooth module was attached to the Arduino board. An app on the phone was used to remotely control the machine. The Arduino was used in PWM mode to control the motor. The prototype used 18V-5W solar panels to power the motor and save extra power required to charge battery. The solar output was given to DC regulators which after regulating the voltage supplied it to the battery. The conveyor belt used was made of polyvinyl. The conveyor belt was controlled by the Arduino system by using a motor driven circuit. The belt had a lifting capacity of 14kg. Two lead-acid batteries were used, one being 12V and the other being 6V. Three DC motors were used in the machine. First motor is used to control the direction of the machine and the other is used to control the conveyor movement. The Bluetooth module was connected to the Arduino board and controlled remotely via Blucontrol app on an android phone. The Arduino was programmed to send signals to the motor to run in a particular direction at a fixed speed. This enabled the remote control of the motor

and ultimately the machine. The idea was simple and effective in working. The idea can be worked on large scale for control of bigger machines, but is still a challenging task.

#### IV. DESIGN STRUCTURE:

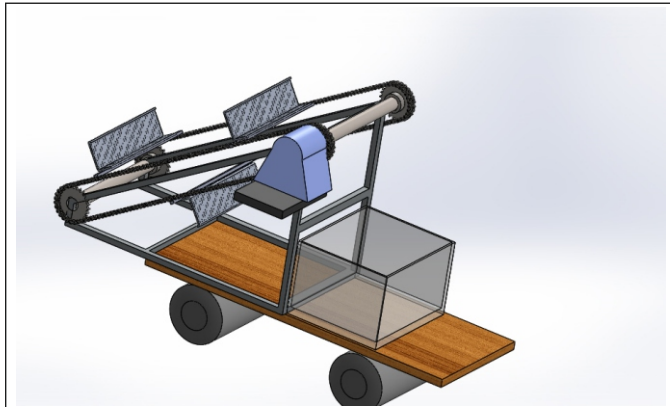


Fig. 1: CAD Model

The various components required are:

- DC Wiper motor
- Battery
- Coupling
- Shaft
- Simple Roller Chain
- Sprocket
- Frame
- PVC pipes
- U-Clamps
- Nuts & Bolts
- Collector bin
- Aluminium plates
- Motor base & housing
- Plywood

The accessory consists of a wooden plank serving as the base of the machine. The frame of the machine has been fabricated using low carbon steel bars having L-section and 18-gauge thickness. The bars have been welded together and screwed onto the wooden base. Two shafts have been mounted on the frame using pillow block bearing. The sprocket has been mounted onto the shafts. The simple roller chain transmits power from driver to the driven shaft. The upper shaft is coupled to a DC Wiper motor to power the chains. Collector plates are mounted onto the chain for collection and transmission of plastic. A bin is placed on the base for collecting the waste. For enabling the accessory to float 2 PVC pipes have been used. The ends of the PVC pipes have been sealed using caps. These pipes have been attached at the wooden base using U-clamps.

The dimensions of the wooden base have been considered as per requirement. The frame dimensions are then adjusted according to wooden base dimensions. The DC Wiper motor is selected by calculation of power required, already knowing the total plastic load to be conveyed and the speed at which it has to be conveyed. The selection of chain and sprocket has been done using the standard formulae knowing the total power to be transmitted. The battery is then selected according to the rating of the motor and the duration of operation. The collector plates have to be perforated for smooth operation during collection allowing water to flow through it. The dimension of PVC pipes has been calculated using the Archimedes principle and equating the total weight of the machine against the weight of water displaced by two PVC pipes. The diameter for the pipes can be found out using this the above method.

#### V. RESULT:

The accessory fabricated has the following specifications:

- Motor power-14 Watt, Speed-50 rpm, V-12 Volts, I-1.16 A
- Simple roller chain 06 B.
- Shaft diameter-12mm
- Total waste collection capacity- 6 kgs

- Machine length-79cm, width-42cm, height-51cm
- PVC pipe radius-8.89cm



Fig. 2: Manufactured Accessory on water



Fig. 3: Manufactured Accessory

This accessory can be attached to the by making use of the unique pontoon hull of paddle boats. The rear portion of the wooden base can be directly slotted into the pontoon hull fastened to the machine using ropes.

#### VI. CONCLUSION:

This project is fabricated on the basis of literature and research on different journal and paper relevantly available and fabricated in accordance so it provides flexibility in operation. The project is very useful for small scale work. This system is able to collect garbage from water bodies with the help of a paddle boat and human intervention. Given motor has power of 14 watt and battery has a rating of 1.3Ah. It is estimated that the project can work up to 1 hour on its full capacity and collect 6 kilograms of plastic at one single run before the collector bin gets full. The accessory can be further improved by incorporation of independent propulsion and remote control using microcontroller.

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